BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF HAWAII

In the Matter of the	)	PUC DOCKET NO. 2008-0273
	)	
PUBLIC UTILITIES COMMISSION	)	
	)	
Instituting a Proceeding to	)	
Investigate the Implementation Of	)	
Feed-in Tariffs	)	
	)	
	)	

SOPOGY, INC. RESPONSES TO INFORMATION REQUESTS FROM THE NATIONAL REGULATORY RESEARCH INSTITUTE AND NATIONAL RENEWABLE ENERGY LABORATORY

AND

CERTIFICATE OF SERVICE

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SOPOGY, INC., a Delaware corporation (the "**Company**"), respectfully submits this memorandum to the State of Hawaii Public Utilities Commission (the "**Commission**") its Responses to Information Requests from the National Regulatory Research Institute ("**NRRI**") and National Renewable Energy Laboratory ("**NREL**"), issued to parties in the above docket under cover of the Commission's letter, dated February 19, 2010.

Respectfully submitted.

DATED: Honolulu, Hawaii, March 4, 2010

PAMELA ANN JOE, ESQ.
VP of Public Policy and General Counsel
Sopogy, Inc.

SOPOGY, INC. RESPONSES TO INFORMATION REQUESTS FROM THE NATIONAL REGUALTORY RESEARCH INSTITUTE AND NATIONAL RENEWABLE ENERGY LABORATORY

PUC-IR-340 - To Sopogy

According to page 6 of Sopogy's comments on the HECO Companies' proposed Tier 1 and Tier 2 rates:

> **"The Company estimates the fixed O&M costs for CSP technologies to be approximately $584 or ($29/kW) a year for a Tier 1 facility and $45,707 ($91/kW) for a Tier 2 facility."**

(a) Please describe the basis for these cost estimates. Include any underlying calculations and citations.

(b) Why would the fixed costs be several times higher for Tier 2 projects than Tier 1 projects? Please provide support for this claimed diseconomy of scale.

Sopogy's Response:

In estimating the Tier 1 and Tier 2 O&M costs, the Company referenced O&M costs for various concentrating solar thermal (CSP) facilities and adjusted these costs for a 20kW and 500kW facility (as these were the size plants modeled for by the parties in the Tier 1 and Tier 2 rate filings).

The Company used the O&M data included in the April 2006 National Renewable Energy Laboratory (NREL) report by Black and Veatch, "Economic, Energy, and Environmental Benefits of Concentrating Solar Power in California" (the "**NREL Report**"), available at http://www.nrel.gov/csp/pdfs/39291.pdf, and the January 2008 "Solar Energy Site Assessment (Phase I)" (the "**Tucson Report**"), available at http://www.ci.tucson.az.us/water/docs/report_tucson_solar_final.pdf, prepared by the Tucson Water Department and Arizona Electric Power as general reference points, though both studies included O&M information for much larger facility sizes. Specifically, the NREL Report projected that 2009 O&M costs to be $61.04/kW for a 100MW system and the Tucson Report reported actual O&M costs for 25MW solar and 100MW solar power plants at $65/kWh. As such, these reports provided helpful benchmarks, but were not definitive with respect to smaller Tier 1 and Tier 2 sized projects.

The Company next adjusted these benchmarks for what it estimated to be the actual O&M costs for smaller Tier 1 and Tier 2 projects. The resulting discrepancies between the Company's estimates and the benchmarks, and between the final Tier 1 and Tier 2 are due primarily to economies of scale and O&M differing labor requirements.

With respect to Tier 1 projects – specifically a 20kW project -- the Company adjusted the fixed estimated cost of O&M downward because a project of this size would likely not require as significant a cost for generator maintenance given the types of generators available in this size range. These are largely off-the-shelf self-contained "plug-and-play" units requiring little installation complexity and operation and maintenance expense. The Company further reduced the estimated fixed O&M cost to reflect the lower

level of labor cost that would be associated with projects of this size, and assumed the periodic manpower need merely be absorbed by the system owner's existing facilities personnel, thus resulting in minimal, if any, additional expense. As such, the Company's estimated fixed O&M costs for a 20kW project is primarily composed of the cost of water consumption for cleaning and cooling (estimated at approximately $1.35/kW) and generator maintenance (approximately $21/kW) and hourly labor costs (if any) (approximately $7/kW). Therefore, the total estimated fixed O&M Cost for a 20kW project was approximately $29/kW.

In contrast, a Tier 2 project – specifically a 500kW project -- will likely require a much higher fixed annual O&M cost, mainly due to the demands of generators in this size range and greater operation and maintenance requirement, including personnel. Specifically, the Company increased the estimated fixed O&M for a 500kW project due to the expense of operating and maintaining generators of in the 250kW to 500kW size range. A data sheet for a sample generator in this range is included in the Company's comments on proposed Tier 1 and Tier 2 Tariffs, which sheet listed O&M costs for a 500 kW system to approximately $21/kW. Moreover, unlike a 20kW facility, the Company assumes that the operation and maintenance demands of a 500 kW facility (which is approximately a 4-acre facility) are significant enough to require a full time worker, which adds the expense of a full-time salary and benefits. For example, the Company supplied CSP solar equipment for a 4-acre CSP power generation facility in Kona, Hawaii, which is owned and operated by a separate company Keahole Solar Power LLC. Keahole Solar Power LLC employs one (1) full-time employee to operate and maintain the facility. The Company estimated the cost of this employee (wages plus benefits) to be approximately $35,000 (which may be significantly below Hawaii market wages for this level position) to arrive at $70/kW. Finally, the Company estimated $0.27/kW for water consumption for cleaning and cooling requirements. Therefore, the Company's total estimated O&M for a 500kW facility was approximately $91/kW.

While the Company's estimated fixed annual O&M for a Tier 2 project is significantly higher than the $61-$65 range set forth in the NREL Report and the Tuscon Report, it is important to note that a 500kW sized project may be an inefficient project size from an O&M standpoint due to the generators suitable for this size of project and the labor needs, which are just enough to require a full-time employee. As projects get larger, however, the Company expects that efficiencies of scale will be achieved, thus bringing the fixed annual O&M cost down to be closer to the $61-65/kW range set forth in NREL Report and the Tuscon Report.

PUC-IR-341 – To Sopogy

According to page 6 of Sopogy's comments on the HECO Companies' proposed Tier 1 and Tier 2 rates:

> **"The Company estimates the variable O&M costs to be approximately five percent (5%) of the capital cost of the facility, or $24/MWh for Tier 1 facilities and $11/MWh for Tier 2 facilities. These costs may vary, however, depending upon whether the facility driven by traditional-scale CSP technologies or smaller-scale technologies."**

Please provide any calculations supporting a 5% per-variable on O&M costs in addition to the fixed O&M costs.

Sopogy's Response:

To arrive at the estimated variable O&M cost for the Tier 1 and Tier 2 facilities, the Company analyzed projected periodic maintenance costs associated with each system over a projected 20-year project life. The Company identified CSP-trough system components widely used in the CSP industry and estimated the replacement levels for each of these components. As most of these components do not have published fail-rates or standard multi-year warranties, the Company had to employ its best judgment in most cases based upon its dealings with various vendors and experience of its engineers. Based upon general knowledge of other installed facilities, the Company estimated 25-30% of the variable O&M cost of a facility to be attributed to the engine. As a result, the remaining 65-70% of the variable O&M cost would be attributed to the solar array, as broken down further in the table below:

Component	**Estimated Replacement Rate During 20-Year Project Life**	**Estimated Total Replacement Cost For Tier 1 Based Upon Current Commercially Available Components**	**Estimated Total Replacement Cost For Tier 2 Based Upon Current Commercially Available Components**
Reflective Surface	100% after 10-years	$10,950	$82,387
Pumps	100% after 10-years	-	$8,000
Heat Transfer Fluid	Possibility of 100%, but not expected	-	-
Cooling Tower	Possibly of 100%, but not expected	-	-
Motors	50%	$1,320	$6,600
Gaskets	50%	$2,625	$32,917
Tubes	25%	$1,574	$23,694
Ball Joints	25%	unknown	unknown
Temperature Sensors Pressure Sensors	50%	$150	$150
Total		**$16,619**	**$153,748**

The Company further reduced thee estimated variable O&M costs for a Tier 1 facility to approximately $10,600 for the possibility that not all of the replacements will need to be made. Finally, the Company averaged these costs over a 20-year period to arrive at the final variable O&M costs discussed in the Company's Comments on Tier 1 and Tier 2 Tariffs.

The Company respectfully submits the forgoing responses and hopes NRRI, NREL and the Commission find them of use. The Company believes that the Proposed Tariffs will not accelerate and incentivize the development of renewable energy facilities in the State of Hawaii and urges the Commission to make appropriate adjustments to the Proposed Tariffs to accomplish this objective.

CERTIFICATE OF SERVICE

I hereby certify that I have on this date served a copy of Sopogy, Inc. Reponses to Information Requests From the National Regulatory Research Institute and the National Renewable Energy Laboratory upon the following parties, by causing a copy hereof to be hand delivered, e-mailed, or mailed, U.S. postage prepaid, and properly addressed to each such entity.

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